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Technical Report

Evaluation of the Validation of the Software Tool

NI TestStand

Manufacturer:

National Instruments Corporation
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Testing Body:

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Revision Log

Revision	Date	Name	Changes/History
0.1	08.08.2013	Nicole Pappler	Initial Version
0.2	09.08.2013	Doris Wild	Review
1.0	12.08.2013	Pappler/Wild	Final Version



Automotive

Content	Page
1 PURPOSE AND SCOPE.....	4
2 PRODUCT OVERVIEW.....	4
3 IDENTIFICATION	5
4 DOCUMENTATION	6
4.1 DOCUMENTATIONS PROVIDED BY THE TOOL VENDOR.....	6
4.2 DOCUMENTATION GENERATED BY TÜV SÜD AUTOMOTIVE GMBH.....	6
5 EXAMINATION PROCEDURE AND RESULTS.....	7
5.1 VALIDATION OF THE SOFTWARE TOOL.....	7
5.2 SAFETY MANUAL	8
6 SUMMARY AND OVERALL JUDGEMENT	9



Automotive

1 Purpose and scope

In the development of systems of any kind software tools take over more and more tasks. Using tools in the development helps to sort and accelerate a lot of tasks, but they can also introduce errors or mask existing errors in many ways. Hence, in a safety related development process, special attention must always be paid to the usage of the tools used during the different steps of the safety development processes.

There are many approaches how to succeed in getting enough confidence in the tools, depending on the domain the tool is used in and the safety standard used in this domain.

TÜV SÜD Automotive GmbH evaluated the software tool TestStand by National Instruments, based on the main assets which are 'trustworthiness' and 'safety manual'.

Trustworthiness can be assured by performing a suitable combination of the following qualification measures defined by the ISO 26262:2011:

- Increased confidence from use in accordance with ISO 26262:2011-8, 11.4.7
- Evaluation of the development process in accordance with ISO 26262:2011-8, 11.4.8
- Validation of the software tool in accordance with ISO 26262:2011-8, 11.4.9
- Development (of the tool) in accordance with a safety standard

In this report the trustworthiness of the software tools is assessed by evaluating the validation of the software tool. Validation is done here with the NI TestStand Qualification Kit. The NI TestStand Qualification Kit is a test suite which enables the tool user to test the installed software for its integrity.

The safety manual is a document which supports the user to apply the software tools correctly during the development of a safety relevant system. It has been developed by National Instruments and TÜV SÜD Automotive GmbH agreed on its final version.

All related documentation of these assets regarding NI TestStand were reviewed by TÜV SÜD Automotive GmbH.

Use cases which are not described in the safety manual are out of scope of this report.

2 Product overview

National Instruments TestStand is a test management tool to develop and run automated tests. It consists of Sequence Editor, which resembles the user interface and a TestStand Engine which loads and interprets the sequence files from the sequence editor. Module Adapters provide the interface between the TestStand engine and the code module resources that actually control the test hardware.

3 Identification

Subject to this evaluation on the software tool NI TestStand (see Table 1).

Table 1: Product identification

Release date	Product name and version	Notes	Related Safety manual
29.07.2013	NI TestStand	Included Functionality TestStand Engine Adapters (see Safety Manual)	TestStand_SafetyManual_NI_2012.docx, Revision 1.0, 05/06/13

4 Documentation

The following documentations applied on the software tool NI TestStand and was provided by National Instruments.

The final versions of the documentation were provided embedded in the installation file of TestStand.

4.1 Documentations provided by the tool vendor

Table 3: Provided documentations by National Instruments Corporation

No.	Title/Filename	Rev.	Date	English description
[D1]	TestStand_SafetyManual_NI-2012	1.0	05/06/2013	Safety Manual
[D2]	TestStand Tool Trace Matrix.doc	1.1	07/08/2013	Trace Matrix Requirements/Use Cases/Validation
[D3]	TestStand_TOR.doc	2.0	09/19/2013	NI TestStand Tool Operational Requirements
[D4]	Test Stand 2012 Qualification Kit	N/A	07/29/2013	Folder with all validation data, generated when installing NI TestStand

4.2 Documentation generated by TÜV SÜD Automotive GmbH

During the review activities by TÜV SÜD Automotive GmbH, several versions of the TÜV review protocol were exchanged between both parties.

The assessment minutes and final agreed versions for review protocols are:

Table 4: Generated documentation by TÜV SÜD Automotive GmbH

No.	Title/Filename	Rev.	Date	English description
[A1]	Reviewprotokoll_NI_Testst and_SafetyManual_v0_4	0.4	12.08.2013	Review protocol for Safety manual – final version
[A2]	Internal documentation	N/A	29.07.2013	Minutes taken down during the validation net meeting, stored on internal project server



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5 Examination procedure and results

For this report both the validation and the safety manual have been evaluated.

First a Kick-Off meeting took place where the detailed steps of this project were defined. The assessment of the safety manual has been iterative. The feedback from TÜV SÜD Automotive GmbH was used for the improvement of the subsequent version of the safety manual. The validation has been assessed in form of a demonstration of the NI TestStand Tool Qualification Kit [D4], its application and the coverage of functionality and use cases listed in the safety manual [D1].

5.1 Validation of the software tool

TÜV SÜD Automotive GmbH evaluated the measures of the validation of software tool NI TestStand. The scope of the evaluated validation is described in the Safety Manual [D1].

For enabling the tool user to perform validation checks on his own platform, NI provides the tool user with a validation suite, called NI TestStand Tool Qualification Kit [D4]. This tool has been developed by CertTech for National Instruments. It consists of a test sequence where user interaction is needed and a subsequent test sequence which runs automatically. The tool user can run the Tool Qualification Kit from the TestStand installation folder and is informed about the progress and the outcome of these validation tests.

The basis for these tests are the tool operational requirements (TOR) [D3], which lists the detailed functional requirements of the process model, test engine, adapters and built-in test steps. As the safety manual [D1] is a document which lists functional requirements in the format of use cases, these use cases also need test coverage. These use cases are also covered by the NI TestStand Tool Qualification Kit.

Prove that both the requirements from the tool operational requirements and the use cases from the safety manual [D1] are covered by the test cases performed by the NI TestStand Tool Qualification Kit is given by a traceability matrix [D2]. A successful run of the NI TestStand Tool Qualification Kit informs the tool user that all functional requirements of NI TestStand have been successfully tested. Furthermore, a report of this test is stored in the installation folder of NI TestStand.

The Tool Qualification Kit has been evaluated during a web meeting [A2], spot checks on the coverage have been performed offline.

Result:

The qualification method “Validation of the software tool” (ISO 26262-8, 11.4.9), was assessed successfully by an independent organization (TÜV SÜD Automotive GmbH). The assessment of the validation has focused on the use cases stated in the safety manual [D1].



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5.2 Safety manual

The safety manual is a handbook that guides the user to apply the tools safely. It contains the main use cases, inputs/outputs, work flows, main risks and main mitigation measures. During offline reviews and assessments TÜV SÜD Automotive GmbH has reviewed the safety manual [D1] several times until a final version was agreed. The results of these activities are described in the review protocol of the safety manual [A1].

The safety manual also describes how National Instruments tracks bugs within its Corrective Action Request (CAR) database. Customers can trigger the creation of a CAR by contacting the customer support at any time. Once a CAR gets closed, a NI Application Engineer notifies the customer that the issue has been fixed. TestStand users can access a listing of the CAR database entries or other known issues by contacting the NI Product Support Department. Detailed information on this is given in the safety manual.



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6 Summary and overall judgement

TÜV SÜD Automotive performed for the SW tool NI TestStand the evaluation of the general tool validation focusing on the use cases stated in the related safety manual [D1], which are validated by the NI TestStand Tool Qualification Kit [D4].

If the user runs the NI TestStand Tool Qualification Kit and adheres to the safety manual [D1], it can be claimed that the qualification measure “Validation of the software tool (ISO26262:2011, Part 8-11.4.9)” is fulfilled. This contributes to the overall tool evaluation and qualification process of the tool user.

Garching, August 12th 2013

A handwritten signature in black ink that reads 'D. Wild'.

Doris Wild
Senior Safety Expert
TÜV SÜD Automotive GmbH

A handwritten signature in black ink that reads 'Pappler'.

Nicole Pappler
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